OIPE JC109 MAY 31 2005 PATENT & TRADEMARK OFFICE

SU 1694411 Translation

Description of the invention

Facility for manufacture of composite material films

The invention relates to the engineering and the technology for manufacture of composite materials on a polymer basis. The object of the invention is to improve the technology for film manufacture. This improvement is achieved in that the facility for manufacture of composite material film, comprising a small roller with the first strip electrode and rollers for applying the molten polymer compound, is supplemented by a chamber for injection of the filler.
This chamber houses an atomizer, an electrode, a small roller with the second strip electrode, and rollers for shaping the composite material film. When the strip pulling mechanism is started, molten polymer is applied to the first strip electrode using the rollers. Furthermore, the composite material is moved through the chamber and at the same time the filler is injected into the film, while the second electrode is added to the composite material.
As a result, both the shaping of the composite material film and its polarization are performed in just one technological step, which considerably shortens the process for manufacture of film. In addition, it is possible to produce films in any surface area and in unlimited length, the limits being set solely by the width of the strip electrodes used. It is possible without difficulty to vary the thickness of the film depending on the spacing of the rollers and to vary the concentration of the filler depending on the pulling speed of the strip pulling mechanism.

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The sketch shows the facility described – general view.

The facility for manufacture of the composite material film is designed as follows:
"1" strip pulling mechanism, containing the small roller "2" with the first strip electrode "3" and rollers "4" for applying the molten polymer.

The facility was provided with the chamber "5" for injection of the filler, comprising the housing "6" containing the atomizer "7" and the electrode "8" at an acute angle α to one another, the small roller "9" with the second strip electrode "10", and rollers "11" for shaping the composite material film.

The facility contains a trough "12" for melting the polymer and a workbench top "13" which are heated to the appropriate temperature by a heater "14". All parts are covered by a protective device "5".

Voltage to the electrodes "3", "8" and "10" comes from a current source "16".

The finished film is wound onto a hollow cylinder "17".

The facility functions as follows:

Using an electric motor (not shown on the sketch) the strip pulling mechanism "1" is set in motion. Molten polymer compound from the trough "12" is applied with the aid of the rollers "4" onto the flexible metal strip acting as the first strip electrode "2/" (negatively charged). Then the metal strip with the applied polymer film passes between the heated workbench top "13" and the chamber "5" for injection of the filler. The filler (piezo-ceramic powder) is here injected / blown in by the atomizer "7" which is at an acute angle to the electrode "8". The piezo particles reflected by the electrode, which is positively charged with 1000 V, are oriented and impress themselves deeply into the molten polymer film on the metal strip. After impressing of the filler, the oriented particles are pressed into the film with simultaneous addition of the second strip electrode "10".

For this, the rollers "11" for shaping the composite material film together with the second strip electrode "10", which is positively charged with about 1000 V, are introduced into the filler chamber in order to polarize the composite material film. The polarization procedure is performed for about 10 to 15 minutes.

After passing out of the chamber "5", the composite material film "18" solidifies and is wound onto a hollow cylinder.

The facility permits both shaping and polarization of the composite material film to be implemented in one technological process. Injection of the filler with oriented particles, pressing in of the particles and polarization are performed in one cycle, with orientation of the particles prior to polarization of the film allowing a considerable shortening of the time for polarization from 1 – 1.5 hours to 10 – 15 minutes.